Task Order No. 832

USAID Contract No. PCE-I-00-96-00002-00

Egyptian Environmental Policy Program
Program Support Unit

Tranche 1, Objective 9

Review and Assessment of the Environmental Policy Assistance Project's Examination of Economic Instruments for Industrial Pollution Control in Egypt

Dr. Glenn E. Morris

January 2001

PSU-35

for
U.S. Agency For International Development
Cairo

by
Environmental Policy & Institutional Strengthening
Indefinite Quantity Contract (EPIQ)

A USAID-funded project consortium led by International Resources Group, Ltd.

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Fact Sheet

USAID Contract No.:	PCE-I-00-96-00002-00 Task Order No. 832
Contract Purpose:	Provide core management and analytical technical services to the Egyptian Environmental Policy Program (EEPP) through a Program Support Unit (PSU)
USAID/Egypt's Cognizant Technical Officer:	Holly Ferrette
Contractor Name:	International Resources Group, Ltd.
Primary Beneficiary:	Egyptian Environmental Affairs Agency (EEAA)
EEAA Counterpart:	Eng. Dahlia Lotayef

Preface

Through competitive bidding, the U.S. Agency for International Development (USAID) awarded a multi-year contract to a team managed by International Resources Group, Ltd. (IRG) to support the development and implementation of environmentally sound strategic planning, and strengthening of environmental policies and institutions, in countries where USAID is active. Under this contract, termed the Environmental Policy and Institutional Strengthening Indefinite Quantity Contract (EPIQ), IRG is assisting USAID/Egypt with implementing a large part of the Egyptian Environmental Policy Program (EEPP).

This program was agreed-to following negotiations between the Government of the United States, acting through USAID, and the Arab Republic of Egypt, acting through the Egyptian Environmental Affairs Agency (EEAA) of the Ministry of State for Environmental Affairs, the Ministry of Petroleum's Organization for Energy Planning, and the Ministry of Tourism's Tourism Development Authority. These negotiations culminated with the signing of a Memorandum of Understanding in 1999, whereby the Government of Egypt would seek to implement a set of environmental policy measures, using technical support and other assistance provided by USAID. The Egyptian Environmental Policy Program is a multi-year activity to support policy, institutional, and regulatory reforms in the environmental sector, focusing on economic and institutional constraints, cleaner and more efficient energy use, reduced air pollution, improved solid waste management, and natural resources managed for environmental sustainability.

USAID has engaged the EPIQ contractor to provide Program Support Unit (PSU) services to EEPP. The PSU has key responsibilities of providing overall coordination of EEPP technical assistance, limited crosscutting expertise and technical assistance to the three Egyptian agencies, and most of the technical assistance that EEAA may seek when achieving its policy measures.

The EPIQ team includes the following organizations:

- Prime Contractor: International Resources Group
- Partner Organization:
  - Winrock International
- Core Group:
  - Management Systems International, Inc.
  - PADCO
  - Development Alternatives, Inc.
- Collaborating Organizations:
  - The Tellus Institute
  - KBN Engineering & Applied Sciences, Inc.
  - Keller-Bliesner Engineering
  - Conservation International
  - Resource Management International, Inc.
  - World Resources Institute's Center For International Development Management
  - The Urban Institute
  - The CNA Corporation.

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While I have benefited from the able assistance and contributions of my colleagues at EEAA and the PSU, I am conscious of the likelihood that I have not fully understood or properly represented some aspects of past economic instrument studies I reviewed. Responsibility for such errors is mine alone.

Glenn Morris
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SUMMARY AND CONCLUSIONS

This report reviews the Environmental Policy Assistance Project (EPAP) studies of the potential for use of economic instruments (EI) as effective environmental protection tools in Egypt. These studies confine themselves to use of EIs to control industrial pollution sources. While we find some faults with the scope and detail of EI characterization contained in the report, we also find that the investigating team did a first rate examination of control options and costs in several sectors that are the source of serious pollution problems. Given the recent advent of some important institutional changes in as recommended in the Project's final report (ERM, 1998b) and the background work already done by the EPAP study, we recommend that the current EI study being undertake by EEAA and PSU give serious consideration to the following new EIs:

- An emission charge on all TSP emissions from lead smelters with revenues used to support inspection and monitoring of the formal lead smelting sector and control of "informal" lead smelting activities,
- A product charge on sodium-cyanide with rebate of part of this charge for sodium-cyanide containing effluent when delivered to an approved effluent treatment facility, and
- An emission charge on TSP emissions in excess of current standards for iron foundries. Revenues to be used for three purposes: development and operation of emissions monitoring plans for the sector, capitalization of a revolving fund to support financially qualifying investments by the foundry sector, and payment of management fees to management of the revolving fund.

INTRODUCTION

In recent years there have been two projects whose aim was to examine possible use of EIs for environmental protection. Both projects were commissioned by, and undertaken with the collaboration and assistance of, EEAA. The Organization Support Program (OSP) of the DANIDA program of the Danish Ministry of Environment (DEPA) sponsored the first project from 1996 to 1997. The second set of studies was sponsored by the World Bank as part of the EPAP Project. These EPAP initiative produced a series of studies and reports from 1997-1998.

This report contains an examination of the reports produced by EPAP. It contains descriptions of the approach taken in that Project, the EIs examined, and lessons offered by both the specific EIs considered and the general consideration of EIs in Egypt.

EPAP STUDY

ERM Economics of the United Kingdom conducted the EPAP examination of EI prospects in Egypt. ERM Economics was assisted by Environmental Resources (ER), an Egyptian consulting company. The Project was oriented exclusively toward application of EIs or, in the lexicon of the EPAP, market based instruments (MBIs), in industrial sectors (ERM, 1997, p. 1-2). The study did not examine use of EIs in conjunction with municipal or other public services or in other important contexts such as transport or household production or consumption activities.

EPAP only examined use of new or increased pollution or product charges as potential economic instruments (reduction in existing subsidies was not considered). The EIs considered usually included earmarking of the revenues raised by product or emission charges to finance environmentally beneficial activities. These were most often to be pollution reducing activities in the industrial sector that paid the emission charges or that used or produced the product that was charged. Other features of the EPAP studies were:

- No primary data collection in the initial two stages of identification and screening of attractive EIs,
- Screening initially based on industrial pollutants believed to be particular problems,
- Focus on point sources, not "fugitive emissions" (since the former are usually are easier to measure and monitor),
- Examine separately each industrial sector producing a pollutant category identified as important, and
- Search for pollutant/sector combinations that would meet ideal conditions for application of an EI.

The EPAP work proceeded in three phases: 1. identification and screening of industrial EI possibilities (the "scoping" study), 2. a preliminary assessment of a subset of likely candidate sectors/pollutant combinations, and 3. a more detailed evaluation of a short list of candidates and a final report (ERM, June 1998)[1].

Phase I – Identification and Initial Screening Activities

The identification process involved compiling a list of roughly thirty sector/pollutant combinations. The Project then used judgement and expert opinion to narrow the possible list of pollutant/sector combinations. A very important criteria used in this screening was a judgement as to whether there was sufficient variation in control costs across sources in a sector to suggest that an economic instrument would produce "efficiency benefits"[2]. Such a judgement was used to eliminate candidate pollutant/sectors emitting airborne metals, ammonium nitrate, and urea. Variation in control costs leads to cost savings for EIs relative to command and control standards because the EI allows more latitude in the mix of controls used to achieve an aggregate level of emissions reduction. The authors made no effort in their screening to test whether the marginal costs of control for an EI, whatever the variation in control costs, would be commensurate with the marginal benefits of control.

The Project also examined use of EIs in other countries as part of Phase I. The Scoping Report concluded, "there is limited experience worldwide which addresses the specific environmental issues which have emerged as priorities in the Egyptian context" (ERM, 1997, p. 35). There was no elaboration of the examples or reasoning that led to this conclusion in the Scoping Report.

[1] These three phases of the EPAP project and the activities undertaken in each Phase seems to have changed as the work progressed. We have chosen to treat as part of the second or preliminary assessment phase of the Project the EI reviews included toward the end of the Scoping Report (ERM, 1997).

[2] "Efficiency benefits" are defined as the cost savings achieved to obtain a given level of pollution reduction when sources use their cheapest control option and different sources are permitted to control to different technical or performance standards. This is really a cost-effectiveness criteria and not, strictly speaking, the same thing as economic efficiency.

The ERM Scoping Report also highlighted some of the legal and institutional hurdles that various EIs might face. In particular, they noted the following problem areas of Law 4:

- While it makes some provision for use of economic incentives to promote environmental protection, it isn't clear that the legal language sanctions use of various taxes, fees, or charges i.e., negative incentives.
- It allows imposition of fines for non-compliance but will this provision be interpreted to allow pollution charges e.g., fines when in compliance with the law?
- It makes no explicit provision for possible use of product charges or taxes on polluting inputs.
- It makes no explicit provision for possible use of fine or fee revenues to support environmental investments.

The ERM/ER team is convinced that EIs that involve collection of fees or fines from industrial sectors will only be acceptable in Egypt if those sectors have some assurance that the revenues collected will be "recycled" to support their own environmental protection activities. This is not a necessary feature of a good economic instrument and, in fact, may make it difficult to have an EI that is optimal the economic efficiency perspective. The Project studies introduce “revenue recycling” into every EI design as a political necessity. The study team did not examine whether, and to what extent, this is the case for any particular sector. Neither did they examine whether the benefits of proceeding with an EI that includes a specific design for revenue recycling exceed the costs.

Phase II - Economic Instruments Selected for Preliminary Assessment

The screening process pursued in the EPAP study ended up identifying three candidate pollutant/sector combinations, each of which was considered in combination with two EI "designs":

1. Total Suspended Particulates (TSP) from a variety of industrial sectors[3].
    - A. Product charge on products with earmarked revenue use for sector environmental investments.
    - B. Emission charge on emissions above legal limits with earmarked revenue use for sector environmental investments.
2. Toxic chemical releases from textile finishing nationwide.
    - A. Emission charges on effluents with possible rebate provisions for better performance by sector firms.
    - B. Charges on dye used as inputs and earmarked revenue for sector environmental investments.
3. Organic waste from food and fiber processing nationwide.
    - A. Disposal charge on organic wastes with earmarked revenue for sector environmental investments.
    - B. Charge on food products with rebates if better firm performance on reduction of fiber waste.

[3] These EIs are aimed primarily at sectors that operate in Cairo and whose emissions contribute to the especially poor air quality of the city.

Product Charges on Selected Industries to Reduce TSP Emissions

These charges would follow in the footsteps of the product charge that already was levied on cement. A genuine "post-audit" of revenue collection, its use, and the changes in emissions, etc. that were forthcoming in the case of cement has not, to our knowledge, been performed. The Scoping Report (ERM, 1997) makes the points, however, that the cement product charge:

- Required a Decision of the Council of Ministers,
- Ignored another important problem - solid alkaline wastes, and
- May create another problem of effluent or sludge control if wet scrubbing is chosen to further control cement TSP emissions.

Further consideration of product charges in other industries was abandoned "due to differences in competitive positions" i.e., the sectors had foreign competition, and the product charge "might not yield significant efficiency benefits" (ERM Economics, 1997, p. 40).[4]

Emission Charges on Selected Industries to Reduce TSP Measures

This option is narrowed to TSP emissions from lead smelters and iron foundries. These are discussed below as part of the detailed evaluations undertaken by the EPAP project.

Effluent Charges on Toxic Releases from Textile Finishing and Dyeing

The Scoping Report (ERM Economics, 1997, pp. 42-43) suggest that this might be fertile ground for an EI modeled after the German system that uses estimated emissions and a random verification system. The number and variety of production technologies also suggests "efficiency gains may be considerable". However, further consideration of this option is dismissed because of the "economic difficulties of the sector" and the appearance of injustice if effluent charges are not also applied to other sectors. Most important in backing off from this EI, however, seems to be the judgement that the effluent charge system is "administratively complex", has seldom been used in developing countries, and "implementation of water charges requires a degree of prior enforcement of standards".

Product Charges on Toxic Inputs into Textile Finishing and Dyeing

Further consideration of this option is dismissed primarily because there is no generally accepted way to rank the toxicity of the various inputs. We would second this and amplify by noting that the link between input costs and effluents is likely to be weak, especially in instances where firms that have already taken steps to control toxic effluent emissions.

Waste Disposal Quotas and Charges in the Food Processing Industry

The design proposed for this EI is as follows. An extensive study would be undertaken of all fool processing activities in a region. Solid waste “quotas” would be established for each site based on “good practice” e.g., 20 tons of solid waste for every 100 tons of raw material

[4] The ER and ERM Economics Final Report (1998) sites three industry-specific reports that we do not have for our review: two cover TSP emissions from the iron foundry and lead sectors, respectively, and one covers sodium cyanide emissions from the electroplating sector.

processed. A charge would be assessed on each site for every ton of waste generated in excess of its quota; a "rebate" would be given to any site for every ton of waste, up to the level of its quota, for each ton of solid waste not generated. This scheme would have a legal basis in that the charge would be justified as a user fee for disposal services. It would also be most effective if there were local entities who had an economic use for the organic materials produced as solid waste. This would increase economic alternatives to simple disposal and make meeting the quota less costly.

The initial analysis of this scheme by the ERM/ER team identified these difficulties with the design:

1. It creates an incentive to increase illegal dumping (especially if a rebate is provided for reducing waste below quota levels).
2. Determining a "good practice" basis for the quotas in an accurate and equitable way for a diverse group of activities, sites, processes, etc. will be extremely hard and may be impossible.
3. The design may violate property rights in the form of the "right to dump" the solid waste at certain, traditional sites.
4. Lack of an established organization for undertaking proper management and disposal of wastes may make this design impractical and encourage illegal dumping (see 1. above).

<u>Surcharges on End Products and Use of Revenues to Support Solid Waste Disposal</u>

Preliminary consideration of this option was limited to a broad outline of the process. The surcharge would be levied on end users (presumably at the point of final sale). The revenues produced would be used to support three (actually four) levels of support for any food and fiber processing site's solid waste management efforts:

1. No support.
2. Support level 1 if an environmental audit reveals good, low cost practices are being followed[5].
3. Support level 2 if the site also has a "waste exchange" with by-product industries.
4. Support level 3 if advanced waste control technologies and used at the site.

The ERM report (1997) also lists some difficulties with this EI:

- the heterogeneity of products makes collecting (and we would add determining) the charges difficult,
- lack of an "obvious" institution for collecting charges and channeling subsidies,
- possible adverse distributional consequences caused by the greater burden imposed on poorer groups (who use larger proportions of income to purchase food products).

<u>Summary of the Preliminary Assessment Studies</u>

[5] The text refers to this support as "rebates" but, technically speaking, they are not rebates (since they aren't returned to the customer that paid the surcharge) but transfers from product users to product producers.

1. There is no attempt to rank or quantify the benefits that might result from reduction of one unit of any of the emissions, effluents, or wastes identified.
2. There was no concrete consideration of the cost of the EI, either the cost to the sector or the public or private administrative cost associated with the EI.
3. Discussions of data made it clear that good information on emissions levels and costs of control were generally lacking. This makes it difficult to judge the potential effectiveness of the EI. The Scoping Report was forced to make broad judgements about features of the various EIs with little or weak information and analysis.
4. All six proposals considered by the Scoping Report assumed that any revenues generated would be used to provide financial support for pollution reduction in the source sectors. No details on the design for awarding this support are provided and, given the inherent in making these awards effectively and efficiently, this is a serious omission.
5. Many of the EIs considered were found wanting by the authors on "equity" grounds. In some cases the revenue recycling provision would unfairly penalized firms that already had made pollution control investments. This is an endemic problem with subsidy schemes targeted to induce particular behavior, in this case environmental protection.
6. It was pointed out that fees or charges on pollution by one sector were unfair when other polluting sectors were not subject to the same negative incentives. This is a good reason to apply fees or charges based on the pollutant, not based on the polluting sector. This is a good reason to consider these sector-specific EIs as the beginning of a broader, pollutant-based approach.

Phase III - Detailed Evaluations and Policy Findings and Recommendations

The EPAP studies of EI did make more detailed examinations of three select revenue raising/revenue recycling economic instruments. The ERM/ER team aimed to "develop a skeleton outline" of an EI in the selected sectors. At the same time, they proposed to assess whether each EI is "worthwhile" - could deliver significant "efficiency savings" - and "workable" - "whether it could be implemented" (ERM, June 1998a, p. 1).

<u>Emission Charges on Lead Emissions from Lead Smelting</u>

The EPAP study team of ERM/ER profiled the lead smelting industry (ERM, June, 1998a). This industry uses (apparently) lead acid batteries as feedstock and processes them for the lead they contain. ER/ERM examined combinations of ten abatement technologies that alone or in various combinations reduced TSP emissions from five model plants with different capacities, furnaces, and technologies. These control strategies examined were estimated to be able to reduce the “without controls” emissions at the model plants by five to ninety nine percent. ER/ERM developed cost estimates for the subset of strategies that did not depend on the three most speculative abatement options:

- building a new, cleaner plant with pre-treatment,
- use of bag filters, and
- relocation to areas where, due to natural or demographic phenomenon, exposure to emissions would be reduced.

The ERM study provides a very well developed description of the particulars of cost for the remaining control options. These data and tables indicate the wide range of control and expense associated with reducing emissions from point sources currently operating in the lead

smelting industry. In this regard, the report is really an admirable piece of work. It shows that there exist a wide variety of technologies and control options in an industry composed of fourteen plants and thirty furnaces.[6]
The industry seems, at first glance, to meet the criteria set up at the outset for identifying viable candidates for an EI: is it "worthwhile" and "workable". The wide variety of production and control technologies with different cost-effectiveness provides a fertile setting for achieving "efficiency benefits" from an EI i.e., it seems "worthwhile". An EI also appears to be "workable" in the sense that a monitoring scheme, while expensive, is at least feasible for the point sources of this industry.

The ERM report concludes, however, with a negative appraisal of an EI in the lead smelting industry. The reasons they cite, and our preliminary observations regarding the merit of those reasons, are listed as follows:

1. ER/ERM notes that many of the low cost/ highly effective controls are already used by many facilities of the industry (no specific data are provided in the report). These controls apparently allow many facilities to meet the current, point source TSP emission standard. The report concludes that an emission charge would not result in any change in behavior for these firms. This conclusion is based on a particular EI design assumption; that the emission charge only applies to emissions in excess of the current standard.
2. For those facilities that don't currently meet the standard, the cost of control would be "high". The report estimates that meeting the standard would require annualized costs of six to twelve percent of the current facility revenue ("turnover") of these facilities. In order to provide an incentive for firms to make TSP-reducing investments, the emission charge would also have to be commensurately "high". Unfortunately, the report doesn't examine the damages from TSP emissions from lead smelters to see whether, in fact, these costs are indeed high relative to the health and other damages associated with these emissions.
3. The report suggests that there will be problems of high costs and uncertain effectiveness with respect to monitoring. The costs of the twice-yearly monitoring program are estimated to be roughly one percent of annual revenues. Still, monitoring seems feasible and the report doesn't attempt, once again, to formally examine whether the costs of monitoring will be greater or less than the benefits that accompany the EI.
4. The report indicates that control of TSP using wet scrubbing may simply divert emissions to another media (water and solid waste). The report notes that six lead smelting facilities have wet scrubbing of the vent gases but no effluent treatment. This is, however, a question that is amenable to examination. The costs of control used by the report include effluent treatment and seem to indicate protection of water quality is not prohibitively expensive. Obviously, a more detailed consideration of the EI would include consideration of the inter-media effects of the EI.
5. Finally, ERM/ER notes that the two dominant producers in the industry plan to build two large scale, very clean lead smelters for processing all the used lead acid batteries produced by the country. This would obviate the need for the EI. However, these

[6] There is, apparently, significant "informal" smelting of lead acid batteries occurring in Egypt. The identification and evaluation of the role of this sector in TSP pollution should be examined as part of any analysis in support of an EI for reducing TSP emissions from lead smelting. Management of emissions from this informal sector should be a major feature of the resulting EI design.

plants have still not been built. The conclusion to draw may actually be that the EI is needed to hasten the investment into these newer, cleaner facilities.[7]

As good as the ERM report is (and we think, again, that it is a first rate document in many respects), we would not necessarily draw the same conclusions.[8] With a somewhat broader view of EI design and objectives, we think that one may be able to build a very strong case for an EI in the lead smelting sector. In the attached Environmental Instrument Description (EID) that comprises Appendix 1, we examine a slightly different design that, we think, might address some of the difficulties identified by the ERM report. In fact, we view one of the circumstances that ERM views as adverse to emission charges in lead smelting as extremely appealing. With an emissions charge on lead smelting, the prospect of new, highly efficient and much less polluting lead smelting facilities would be greatly enhanced. This is just the kind of outcome, one that is dynamically efficient, that emission charges seem to be very good at promoting.

A Product Charge with Refunds on Cyanide Used Electro-Plating Operations

The ERM/ER team estimated that over 2000 electro-plating operations produce effluent contaminated with sodium cyanide. Most of these produce effluent with low concentrations of sodium cyanide but roughly 20% produce high concentration effluent. The team examined the possibility of introducing a product charge on sodium cyanide and using the proceeds to pay firms that brought sodium cyanide effluent to a central treatment facility. They decided that such a product charge would not be a good idea because (ERM, June 1998b):

1. Only 20 percent of the effluent is highly concentrated enough to justify transport and treatment at a central treatment facility. However, it isn't clear from the discussion whether the low level of the threat or the cost of transport and treatment, or both, provides the justification for not treating 80 percent of the waste.
2. The cost of treatment at the central facility would be high – a cost per kilogram that is roughly 40% of the price of raw sodium cyanide. This might suggest that the product charge needed to be less than 10% of the price (since only a fifth of the effluent (by cyanide content) would by treated. In addition, it suggests that the recovery cost is much less than the cost of the raw material and is quite justified on economic grounds.
3. An illegal trade in sodium cyanide is active in Egypt and the ERM/ER team is concerned, quite properly, that a product charge may make this trade even more widespread and lucrative.

The fact that ERM/ER conclude their discussion (ERM, June 1998b) with a note that cyanide-free alternatives are being developed and adopted in Europe. Assuming these techniques are not too much more expensive, it seems to us that a product charge on cyanide

[7] In a recent telephone conversation (20/12/00), Mr. Hany Shalaby noted that the EIA for Awadallah's new, clean lead smelting facility were opposed by local interest groups and rejected by EEAA.
[8] Some suggested areas of improvement in the report include: adding the missing Figure on monitoring (Figure 3.3), examination of the extent to which pollution control may pay for themselves (the critical role of capture of emissions - recovery credits), exploration of the damages from these particular TSPs (lead is known to be an especially toxic metal when inhaled or ingested), a clear statement of the status of controls at the plants so we know what the marginal costs the firms really face at present and the benefits that would result from upgrades beyond present practice, a clearer description of the industry structure (e.g., how many firms and market share), and better characterization of the fugitive emissions component of TSP emissions.

would actually promote adoption of these proven technologies. In Appendix 2 of this report we provide an EID for a product charge on sodium cyanide and discuss, in general terms, how it might work to reduce cyanide effluents.

<u>An Emission Charge on TSP Emissions from the Iron Foundry Sector</u>

An ERM study examined conditions in the 550 or so cast iron foundries in Egypt (ERM, 1998b). These foundries are the source of more than 15,000 tons of TSP per year. The study found that the industry used at least seven major process technologies and that there is a wide range of control and process technology options that could reduce TSP emissions from both stack and fugitive sources. Some of these changes even made economic sense now e.g., more efficient burners would pay for themselves in short order due to fuel savings.

The ERM/ER team concluded that this industry sector would be a good candidate for a "compliance fee" on TSP emissions. As the name suggests, the emission charge would apply only to emissions that exceeded current emission standards. Since these standards are presently very stringent, most emissions would be subject to the emission charge. The proposed EI would introduce the fee gradually over an extended period, beginning at 500 E£/year and increasing to 5000 E£/year after six years. According to the report, the EI would be "effective" (reduce emissions by 62%)[9], "economically efficient" (achieve emission reductions at low cost)[10], "flexible and adaptable" (any method of control pollution is encouraged, not just those that meet current standards), and "compatible with existing EEAA policy" (polluter pays).

The EI proposal also includes a vague sketch of a disbursement regime. The report estimates revenues from the compliance fee would be 17 million E£/year. These funds would be administered by an established government agency (the Egyptian Environmental Fund (EF)?). They would be used to support: technical assistance with control technologies and processes, financial assistance, demonstration projects, structural changes in the industry, and technical assistance with monitoring.

The report also identifies the following impediments to the introduction of this EI proposal:

1. Lack of compatibility with the current Law 4 since EEAA is not empowered to levy fines and administration through the courts would require substantial administrative expense.
2. Lack of acceptance by an iron foundry sector accustomed to being rewarded with grants and privileges for pollution control rather than being penalized for continued pollution.
3. Monitoring of emissions for the purpose of determining the emission charge needs to be substantially upgraded and may be expensive, especially if both stack and ambient emissions are to be controlled.

[9] It isn't clear in the report whether this reduction is 62% of total TSP emissions from the iron foundry sector or 62% of emissions in excess of standards.

[10] The text of the report describes the static cost effectiveness advantages of the emission charge; it doesn't address the sufficient conditions for economic efficiency (marginal costs equal to marginal benefits) so the claim is really one of cost effectiveness.

The ERM report (1998b) concludes with a list of suggestions for overcoming these barriers and preparing the way for introduction of a compliance charge on TSP emissions. We elaborate on and modify this proposal in the EID included as Appendix 3 of this report.

FINAL OBSERVATIONS

Product charges are, in general, weak EIs if they are assessed after the pollution event e.g., on products whose products whose production is polluting. Such product charges do not result in any incentive to reduce the polluting by-products of production. They are only effective if prices increase enough for consumers to reduce demand and switch to less polluting products. An example in the case of lead smelting sector would be switching for from lead pipes to plastic pipes for water distribution and collection as a result of a product charge on lead products. In all the EI's reviewed, more attention needs to be given to establishing the elasticity of demand for products whose prices would be affected by the EI.

If a product charge is assessed after the pollution event, and consumption is not expected to change very much or not in environmentally friendly ways, the only significant function of the EI is to raise revenues through indirect taxation. In that instance, the EI should be judged as a tax instrument, not as an economic instrument for environmental protection.

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